An Educator's Guide to Santa Barbara Bugs

in collaboration with Sandra Russell

In our backyards or in nearby untended lots, there is a whole world of small critters, commonly referred to as "bugs." These various classes of ARTHROPODS, all with jointed legs and exoskeletons, may be crustaceans, arachnids, or insects.

Just because they are small and seldom seen doesn't mean that they are not important to many bigger life cycles and systems in healthy environments. For little guys, they do big jobs in keeping the natural world running smoothly.

We can learn a lot by looking for them and keeping them briefly for observation. How do they move? What do they eat? How do they grow and change? What jobs do they do to help our environment stay healthy?

We need simple equipment:

- an old spoon for digging in soil or leaf litter
- plastic bags (the kind newspapers come in can be rolled up tightly and carried in a pocket)
- small jars (plastic, with good caps, like old medicine vials)
- larger jars, plastic tanks, food storage containers, or plastic shoe boxes to become temporary homes for bug guests, with air holes made in sides or top. The clear plastic 40 oz. nut jars from Costco make good containers.
- paper towels
- a simple insect guide book, like the Golden Guide series, will be helpful.

Obviously avoid any dangerous insects—bees, wasps, or anything that is aggressive. The following are gentle and fun to find and observe.

There are lions and tigers and bears—Oh My!—all in the backyard.

The lions are **antlions**, so named because they lie in wait and gobble up ants for dinner. The scientific name, Myrmeleon, gives us a big hint. If there is a patch of sandy soil at the side of a path or under a tree, look for funnel-shaped depressions—this is a trap!

Eddie Dunbar

Antlion trap

At the bottom waits the larva of the antlion, with his pincher shaped jaws ready to grab an ant that falls in. Even if the ant tries to scramble up the slope, the wily lion tosses sand up to knock it back down again.

Mike Caterino

Antlion

Another common name is "doodlebug," and there is a "magic charm" to get the doodlebug to come to the surface. Whisper,"Doodlebug, Doodlebug, come out of your hole," very close to the funnel, and our breath will knock off a little sand, causing the lion to pop to the surface to seize what he thought was falling prey.

Have a lidded container handy. Take a big hand scoop of the sand under the funnel and deposit it in the container. Look for a rounded grey insect about a 6 to 9 mm long scuttling backwards to bury itself again in the sand.

Scoop up some ants to feed the antlion and keep it for observation for a couple of days. Once it settles in and builds another funnel, drop the ants into the trap to watch the action. After that, let the antlion go complete the rest of its life.

Eddie Dunbar

Antlion on a finger

The antlion becomes a completely different looking creature as an adult, with a slender body and wings. The adults fly around at night and will come to lights

in search of nocturnal ants and smaller bugs to eat. They have short, clubbed antennae and long-veined wings. This is a great example of insect babies and adults sharing the environment with different lifestyles.


Mike Caterino

Antlion adult

The bears grow up to be tigers—No kidding!

At dawn and dusk, walk around areas that have oak trees, nasturtiums, or other weedy shrubs, to find the wooly bear caterpillars out on the march. They go out at night to party, eating their foodplants, and then scurrying back to protective leaf litter by dawn to sleep all day. Being black and furry helps them hide and keep warm when they are out at night.


Kit Avila

Wooly Bear

During the day, find wooly bears sleeping under leaves or plant litter. They can be kept in a small tank or plastic container with plenty of leaves to eat. When they have eaten all they can and are ready to become an adult, they "hibernate" for a bit under the leaves, then make a very loose, sloppy cocoon around their brown pupa, resting until it is time to emerge as a tiger moth.


Rick Steinau

Tiger Moths

Tiger moths are common in this area, with one or more of seven local species predominating in a given month. They may be found coming to lights at night. Their distinctive patterns and bright colors make them hard to miss.


Gary McDonald

Painted Tiger Moth

The following mounted lab specimens make identification easier.

The Painted Tiger Moth (*Arachnis picta*) is grey and cream in swirly patterns, with bright coral body and hind wings.


Mike Caterino

Painted Tiger Moth

The Edward's Glassy Wing Tiger Moth (*Pseudohemihyalea edwardsii*) is larger than the Painted Tiger Moth (6 cm wings), with plain beige or lightly patterned see-through wings and a bright orangey-pink abdomen.


Mike Caterino

Edward's Glassy Wing Tiger Moth

The Mexican Tiger Moth (*Notarctia proxima*) is the most common, with beige wings patterned with black triangles. The hind wings of the males are beige, but the females' hind wings have a red and black pattern.


Mike Caterino

Mexican Tiger Moth

Both the Hewlett's and the Ornate Tiger Moth (*Grammia ornate*) resemble the Mexican but are fancier, and the hind wings have a peach to pink color.


Mike Caterino

Ornate Tiger Moth

The Vestal Tiger Moth (*Spilosoma vestalis*) is pure snowy white, with a few black flecks. The front legs are bright red.


Mike Caterino

Vestal Tiger Moth

The Acrea Moth (*Estigmene acrea*) is also white, a little larger, more black spots, and a dramatic gold and black abdomen.


Mike Caterino

Acrea Moth

The Spotted Tiger Moth is yellowish gold with rusty brown mottled markings on the forewings.


Mike Caterino

Spotted Tiger Moth

Tiger moths belong to the Family Arctiidae, which have some unusual characteristics. A sound-sensitive membrane (thoracic ear) enables them to "hear" the approach of bats in time to employ their own defensive measures. Since they are protected by tasting really bad, they inform the bat with a warning sound of their own which the bat heeds (if the bat has spat out one beforfe).

The moth may "faint" and drop like a stone to hide in the undergrowth. In this posture, usually the brightly colored abdomen will also flash the warning color. The visual cue of bright red, pink, or orange with black flashed at the attacker is Nature's way of saying, "Don't eat me!"

The Painted Tiger Moth usually flies at night in very late September and throughout October. Some recent years have produced a few as early as August. Global warming? This species and others with a specific yearly appearance might be good indicators of such a response, or not.

According to Sandy Russell, the emergence of the moths may rely on several factors other than temperature. She once found them flying in May, and concluded that the suburban street lights had thrown off their perception of the daylight cycle. She raised a brood under lights indoors which caused another spring emergence. The species has at least the potential to have two generations a year.

European Cabbage Butterfly *(Pieris rapae)*

Despite its name, this butterfly and its caterpillars live in backyards and don't need cabbages. This is the very common white butterfly we most often see, year round. It really did come from Europe, by accident around 1850, and has spread all over the US. It eats a great variety of garden plants and is even a pest on vegetable crops. If there is nasturtium, there will be white cabbage butterflies.


Eddie Dunbar

Cabbage Butterfly

The easiest way to catch them is not with a net, but by looking on the underside of nasturtium leaves for small green caterpillars. Bring them home with plenty of fresh nasturtium leaves and set them up in a plastic container or tank with air holes on top and paper towels on the bottom. Feed them leaves daily and they will grow bigger until they are ready to pupate.

They will make a slender pointy chrysalis on the lid of the container or a stem of the foodplant. Check the chrysalis daily: in about a week, the white butterfly will emerge. Release the butterfuly and it will find a mate, lay eggs and providemore caterpillars to adopt. They breed continuously, which is called "multivoltine" (many generations each year). Only cold weather slows them down.

Monarch Butterflies *(Danaus plexippus)*

Monarchs will come to an area if there are milkweed plants. We don't have to chase this butterfly with a net either—it is easier and more fun to bring in the caterpillars from the plants and watch them grow, see how MUCH they eat, and then see them go through the metamorphosis to become the beautiful butterfly.


Eddie Dunbar

Monarch Butterflies

A tank or mesh cage is needed with lots of milkweed to feed them. The native Narrow-leaved Milkweed has skinny leaves—not much food. The nursery variety with broader leaves is best to plant. We can find the tiny caterpillars, just a day old, munching the blossoms and tender tops of the plants. As they get larger, they will be on the underside of leaves further down the stalk.

We are doing the caterpillar a favor by bringing it inside and feeding it well, because we are not the only

one out looking for little caterpillars. A parasitic fly is also looking, and will lay its eggs in the caterpillar body, eventually killing it. If we bring the caterpillar in, we are protecting it from parasites, and more caterpillars can live to be adults. By removing the caterpillar from the outside plant, there will be an "empty" plant for the female Monarch to lay more eggs on as well.


Shelly Cox

Monarch Catepillar

The caterpillar will need fresh leaves every day, but it does grow fast. When it is an inch or so long, be sure to have a stick in the tank so it will have a support for its chrysalis. Once it forms that aquamarine and gold chrysalis, there will be between 10 to 14 days before it turns transparent, allowing us to see the butterfly inside.

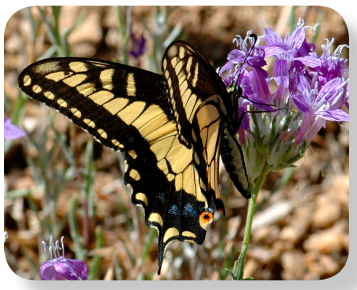

Eddie Dunbar

Monarch Butterfly

When it comes out, it must hang from the support to pump and dry its wings. After a couple hours it will be ready to fly.

Zelicaon Swallowtails *(Papilio zelicaon)*

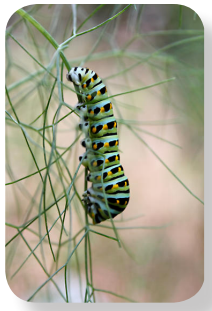
Swallowtails like the wild anise or fennel plant that is found growing in untended lots. It grows pretty tall and is very soft and feathery looking. Carefully examine the leafy part of the plant for striped caterpillars.


Hartmut Wisch

Anise Swallowtail

When a caterpillar is found, bring it back on the stem where it was eating or resting. More fennel can be put in a short glass of water, poked through aluminum foil covering the top. This will prevent the caterpillar from drowning.

Just like the Monarch, it will eat and grow and shed its skin, until it gets to a good size. If gently poked, its head will flash out an orange "Y" and make a little stink so it won't be eaten. This is called the osmeterium and it is another defense, along with good camouflage.


Michael Gatzios

Anise Swallowtail Caterpillar

When the caterpillar makes its chrysalis, it will spin a belt of silk attaching itself to the stem at an angle, just like a utility pole worker. It will make its chrysalis with its head up, matching the surrounding shrubbery in its tank: green and yellow if there are still fresh leaves, brownish tan if there are mostly sticks.

Be patient waiting for it to emerge—it may take a couple of weeks if it is early in the summer. If it is late in the season, it may "sleep" until next spring. In that case, keep it safe, and mist it once a week so it will not dry out.

About caterpillars in general

Different kinds of caterpillars can be found on leaves or stalks of plants in the backyard, or hiding in the soil underneath. Bring them in to raise with the plant that they were eating and they will usually pupate soon. Solve the mystery of what they will become as adults when they emerge. A moth or a butterfly? Large or small? There are a lot of moths that are known only as adults—the scientists have to raise them to see what caterpillars turn into what moths. Be scientists and make your own discovery!

Pallid Band-wing Grasshopper *(Trimeritropis pallidipennis)*

In some years, there are population booms of these insects, appearing in great numbers at lights during the night or leaping from garden and chaparral. The rest of the time they are one


Gary McDonald

Pallid Band-wing Grasshopper

of the more common insects encountered during the day. They are well camouflaged, with brown and cream mottling, usually visible only when they fly, or when take a tremendous leap to avoid an encounter.

Males can make a crackling noise snapping their wings together. This is called "crepitation." They also rub their wings against a row of pegs along the inside of the hind legs. That noise is called "stridulation," like a violin. At the sides of the abdomen there are tympanic organs for hearing all this commotion, as males make the noises to attract females.

The wings of this species are a pale yellow color. Closely related species, with the same general body coloring, sport flashy wings of more visible colors. These colorations are all for species recognition and finding the right mate.

Grasshoppers have chewing mouthparts for eating a wide variety of plants, not just grass. In turn, grasshoppers are eaten by a wide variety of other animals forming a vital link in the food chain. Here we have insects that hide to avoid being eaten, but go to a great deal of noise and flashy behavior to find their mates.

They aren't easy to catch. If one is found, very slowly approach from behind and cup a hand over it quickly before it can hop. Otherwise a net or a large jar will be needed. To handle one, reach in to the container and grasp it FIRMLY by the center back of the body, including the wings.

The insect's defense is escape. Observe how well equipped they are—strong, sticky feet for clinging, front legs to run, powerful hind legs for leaping, and wide, hidden wings for flight. It is surprising how strongly it can kick with those legs.

These and the larger Grey Bird Grasshopper may be kept in a larger tank or mesh cage, with something for them to climb or perch on and fresh food daily, misted with water. They love left over salad greens or rose leaves.

The Grey Bird Grasshopper *(Schistocerca nitens)* begins life as a small bright green nymph, without wings, and growing by molting, it has an incomplete metamorphosis—that is, the babies look very much like the adult, and gradually grow up to be a winged adult. Once an adult, the Grey Bird Grasshopper may live in captivity for two years where he is fed and protected from predators. His cousins in the wild become lunch for another animal.

Ron Hemberger

Grey Bird Grasshopper

When letting the grasshopper go to continue his life in the wild, try an experiment to compare it to kid sizes. Measure the grasshopper with legs extended. Suppose he is 3" long. Measure a child. How many times bigger is the child? (Divide grasshopper inches into kid inches.)

Could kids jump that many times farther than the grasshopper? Before releasing the grasshopper, dip it in water and then gently in powdered sugar or nontoxic chalk dust. Make a mark with chalk where you let it go and see where it lands in one jump. Mark that well so the distance can be measured. Have kids jump from the first mark and mark how far they can jump, keeping both feet together. When that distance is measured, see who is the better jumper!

Katydids belong to the same insect order as the grasshoppers, Orthoptera, and can be found and kept the same way. But they are different in looks and behavior. The big giveaway is those loooong antennae, and the longer and more obvious wings. The katydids are more nocturnal and will come to lights. We hear them at night calling to each other. The male makes a longer song, and the female makes a single emphatic "click." Thick veins at the base of the forewings are rubbed together to make their sounds. Go out at night to listen for them. Even if we know just where the sound is coming from, it is difficult to locate the katydid. They are easier to catch at a bright light left on at night. They

Eddie Dunbar

Katydid

are usually bright green or brownish, depending on which of four species they are.

The Chaparral Shield-backed Katydid *(Idiostatus aequalis)* is tougher and browner than the others, and cannot be kept in the same tank with other species, because they will eat the others, as well as the expected soft foliage or lettuce. Handle these like the grasshoppers, by grasping the back firmly. Remember these guys have chewing mouthparts, and while a bite won't hurt, it is startling and may cause the person holding it to release the grasshopper


Ron Hemberger

Shield-backed Katydid

Other local katydids are the **Broad-winged Katydid** *(Microcentrum rhombifolium)*, which is large, leaf shaped and very green. The females are larger than the males, and they have different songs. When you hear loud "Zipp! Zipp!" noises at night, this is the singer.


Jacqueline Whiteside

Broad-winged Katydid

The **Fork-tailed Katydid** *(Scudderia mexicana)* is also green, but has long wings and a shorter body. The


David J. Ferguson

Fork-tailed Katydid


Alice Abela

Chaparral Katydid

Chaparral Katydid *(Platylyra californica)* is green, but has brown areas on the wings, especially the base, which is where the males make the most noise. Since these are tree dwellers in the woodlands, they are the least likely ones to find in backyards. A couple of katydids can be kept in a large jar, tank or mesh cage and fed lettuce or rose leaves. They will sing at night.

Jerusalem Crickets *(Stenopelmatus species)* are another related insect, but should be handled with real caution. In fact, don't try to pick it up—trap it in a jar or small plastic container without touching it. To handle it, use one of those plastic scoops that come in laundry detergent boxes, with a piece of cardboard over the top once the cricket is inside. These critters have big, strong mandibles and won't hesitate to bite with jaws that can puncture skin, and they are very active when cornered. They don't jump long distances like the grasshoppers or katydids, because their feet are better for digging.


Adam Deglmann

Jerusalem Cricket

They can be kept comfortably in a medium lidded container with a secure lid and airholes punctured through the sides or top. Bark chips or plant litter that they can dig under a bit, maybe a mini "log" to hide under, are all the "furniture" they need.

A slice of potato, carrot or apple to gnaw on, and daily misting of water is needed. Toss in a dead insect for good measure. These guys are omnivores, eating both plants and meat. They will even eat each other, so only one to a tank! They can live two years, and will molt about 10 times to grow to adult size. They don't last long in captivity, maybe a month if they are well fed and their home is kept moist so they can dig.

During the day, they will be burrowed under the chips sleeping. In nature, they live in underground burrows. At night they come up to the surface and go hunting for anything good to eat. They may be found walking around or coming to lights. They communicate with each other by drumming with their abdomens against their burrows.

Why are they interesting? Because they look SO weird, with large amber, bald heads, and fat, striped abdomens. This is the one insect that entomologists are most asked about. They are a widespread family (Stenopelmatidae) of several species, bound to local areas because they are wingless.

This is one insect that everyone notices and calls by a myriad of different names - Sand Crickets, Potato Bugs,

Children of the Earth (Ninas de la Tierra), Chacos, Skull Insect or Old Bald Headed Man and Bone Neck Beetle (in Navajo). In spite of all these bad names, they are not poisonous, and not dangerous if you are careful with your fingers.


David Scriven

Ninas del la Tierra

Because the species are not well defined, new species are being found and studied. A teenaged entomology enthusiast in Oxnard studied and named a species that lives in the strawberry fields. He was invited to appear on the Jay Leno Tonight Show, introducing several large insects.

People often find them dead after rains or near water. They are parasitized by a Horsetail Worm, which grows to maturity inside the cricket. When ready to breed, the parasitic worm releases a hormone which makes the cricket seek water. Once at a rain puddle, or your pool, the worm bursts out, "Alien" style, into a surprisingly long critter that escapes to the water to reproduce and continue the life cycle as the eggs or larvae are ingested by other crickets.

Woodland Cicadas *(Platypedia laticapitata)*, also called Wide-headed Cicadas, are easy to find in the spring in a woodland—just look at the trunks of trees, in particular pine or oaks, to find the molted skins stuck to the bark like so many piles of kid's discarded clothes left on the floor. The nymphs that lived underground all year, sucking on the roots of the trees, are finally ready to become adults. In the morning they crawl up from their underground burrows, up the tree trunk, split their old skins, and pull themselves out as new adults. At first they are soft and bright green. They will need to stretch out and harden their wings and their new exoskeleton.


Mike Caterino

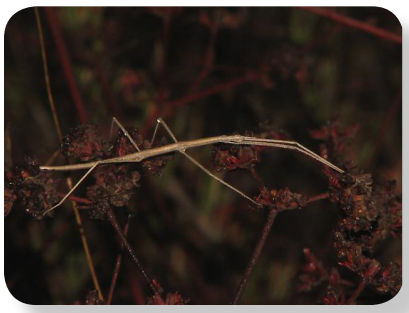
Woodland Cicadas

While they are doing this, this is the best time to find them and gently put them in a container where they can cling to an upright surface. Once they have dried hard and brown, they will be faster crawlers, and can easily fly to the tops of the trees, where they will begin their clicking calls to each other. They do not whirr loudly like the Magicicada species of the East Coast and Midwest states. These are smaller and may be maturing underground for just two to five years, whereas their larger eastern cousins are the famous 17 Year Locusts. Cicadas are "bugs" with sucking mouthparts that suck the juices from plants and their roots.

The Cicadas are harder to keep for long in captivity, as they need plant stems to suck on for food and moisture. They don't live very long, as the adult spends most of its time finding a mate and laying the eggs for the next generation. The flat eggs are laid into slits made into plant stems. But once the nymphs hatch out they drop to the ground to burrow next to the roots of the tree. So it is probably best to let these go after a day—they have lots of work to do.

The **Western Short Horned Walkingstick** *(Parabacillus hesperus)* is HARD to find when you are looking for it, since they are Masters of Camouflage! Between 2.5 and 3.5 inches long, skinny and colored shades of brown to pink, they blend in with the other stems in the local shrubs.

Walkingsticks belong to the insect order Phasmatodea, and are herbivores, remarkable for their camouflage on their foodplants. Our local three species are wingless, but they do move around, and can be found feeding at night or coming to lights. The "horns" referred to are the short antennae. The insect extends its first set of legs straight in front of it to enhance the appearance of a slender twig.


Gerald and Buff Corsi

Walkingstick

They have chewing mouthparts. The food plants are burroweed, globemallow, mountain mahogany and buckwheat. Sometimes they can take rose leaves as an alternative. They may be kept in a plastic container or tank, and will need their foodplants to be fresh, and

misted daily. They should have little branches to sit on. The best way to pick them up is to lift the branch with the attached walkingstick.

In tropical and lusher locales, the species can be very large and flamboyant in form, mimicking leaves and flowers. Many are parthenogenic, that is, the female can lay fertile eggs without need of a male. This is a strategy of survival when one female finds a new habitat to exploit, and it is used by a number of lizard species as well.

The **Timema** is a very different, but related stick insect, that lives on ceanothus or oak leaves. To find them, in the early spring, hold a net under a thick branch of a ceanothus plant, and beat the top of the branch with a stick, knocking everything off into the net. Then check the netting for an inch long, slender green insect moving around rather fast. Pop it into a jar, and transfer it later into a container with some of the food plant leaves.

Jonathan Wright

Timema

It is difficult to find the Timema in a box—they are good at camouflage! If there are more than one, the larger ones may be females. The smaller males sometimes hitch a ride on the back of the female, so they will be close when she decides its time to make eggs.

One local Timema species is in the process of evolving a new species. The normal ones are plain green and eat ceanothus. They stay on the bush and don't fly. The evolving species are striped to match the chamise plants they eat, and they are changing in appearance as well as the food they can tolerate. If they can no longer mate with the others, they may be a new species. Dr. Cristina Sandoval is the local researcher who found the new timema, and it was named ***Timema cristinae*** in her honor. This is an example of local science and continual learning about our environment.

Mantids are another skinny insect with great camouflage, but they are carnivores that hunt, and will eat many plant-eating insects. Think of them as the T. rex of the insect world! There are at least four species to be found in this area. They all hunt at night, so you will find them coming to lights at night in the summer and early fall for the insects attracted there.

The large (up to 4") green mantids are the **Oriental Preying Mantis**, introduced by nurseries to control insect pests. They have wings and can also leap and run fast. The best way to catch them is to clamp a big jar over them and slide on the lid. They can be transferred to a large plastic container, like the mixed salad containers from the grocery store. Make sure to put small airholes in it, and with scissors, cut a U-shaped trapdoor in the top. Secure the door shut with tape. This will create an easy way to give the mantis food without having to take off the lid. They will need live insects to eat every day, like small moths, flies or crickets. A well fed female may spin one or more egg cases. Only one mantid to a tank, please, since they will eat each other!

Larry Arnold

Praying or Preying Mantis

The smaller, 2.5 inch brown patterned mantis is the native **California Mantis *(Stagmomantis californica)***, and can be kept and observed the same way. Even smaller, 1 to 1.5 inches, is the brownish grey **Minor Ground Mantis *(Litaneutria minor)***. They do have wings, and the males especially can fly, but they hunt by running along the ground or branches to catch their prey. Their food must be small also, like the tiny gray "lawn moths."

Mantids are interesting to watch as they stalk and

David J. Ferguson

California Mantis

Peter J. Bryant

Minor Ground Mantis

The **Mediterranean Mantid** *(Iris oratoria)* is about the same size as the California Mantid, but is brownish, greenish or pinkish. They have a dark dot in their armpit that looks like an eye. They were also introduced in the last century, and have become common here. They are more aggressive. To handle it, pick it up gently but firmly by the back of the thorax. They can give a sharp pinch with their forearms, which, of course, is how they snare their food.


Mark H. Brown

Female Mediterranean Mantid forming her ootheca

Mantids are interesting to watch as they stalk and pounce on their food. Once we see how much they eat, we can appreciate how valuable they are in nature!

Earwigs are small, dark insects that are found under things—logs, flower pots, etc. where they are hunting for their even smaller food or hiding themselves. The pincher at the end of the tail may be used for defense, but it is not dangerous.


Eddie Dunbar

Earwig

Both kinds found here came from Europe, but the European Earwign (*Foricula auricularia*) is the most common. In spite of the name, they won't crawl in our ears.

We have to be fast to catch them. Have a collecting container ready before lifting up the log or flower pot, and quickly trap them inside or scoop them up. They may be guarding babies, which are very small and white. The females guard and protect the eggs and babies until they can take care of themselves.

Earwigs go through an incomplete metamorphosis, so if there are babies, you may get to see them grow and They can be kept in a plastic container with small airholes and a good layer of bark litter for them to burrow in. Omnivores, earwigs will eat other smaller insects such as aphids, dead insects, soft lettuce, and nasturtium. If you have a plant stem covered with moist, so mist the bark layer every other day. When they are disturbed, they will run around fast in the container, so keep the lid close by!

Darkling Beetles *(Eleodes species)* are rounded black beetles that are found walking on pavement or paths at dawn and near dusk. Most beetles have wings and can fly, but these cannot because their wing covers, the elytra, are fused together. So they walk everywhere they go. That's okay because their food is on the ground—decaying plant material or bark litter, which they recyle into soil nutrients. They belong to the FBI—fungus, bateria, and insects, the famous decomposers that break down plant garbage and make it useful again.


Eddie Dunbar

Darkling Beetle

Kids call them "stinkbugs" if they have already tried to pick them up and were given a defensive whiff! Because they cannot fly away when a predator comes along, they have developed this defense system, just like skunks. They put their abdomen up in the air as a warning, and when the predator doesn't pull back, the beetle gives it a nasty smelling squirt right on the sensitive nose. This really works on curious dogs.

Once they have been handled enough and are sure they aren't going to be eaten, they settle down and are rather nice insect pets that can be easily kept for a while. A plastic shoe box makes a good "beettle box" with airholes and a good layer of bark litter on the bottom. They like to crawl and climb, so give them tiny logs or other furniture. Using ice-cream sticks attached with a rubber band over a cork, create a seesaw for them, or create other "playground equipment."

They should be misted just to keep things from drying out. For food they will recycle kitchen scraps: fruit or vegetable peelings, a slice of zucchini, leftover french fries (no ketchup), lettuce. Nasturtiums and wilted flower petals can also be offered.

They may lay eggs in the box, and their babies will be visible under the soil that begins to accumulate. Baby beetles are called "grubs" and they look like little caterpillars. Beetles have complete metamorphosis, so

these grubs will form brown pupa cases before they emerge as adults.

Other kinds of beetles that can be kept in the same tank are the **Wooly Darkling Beetles** *(Eleodes osculans)* which are similar but smaller, rounder and covered with reddish brown fuzz, and the **Ironclads** *(Phloedes diabolicus),* which are flatter, with a dull textured, super

Gary McDonald

Wooly Beetle

Ron Hemberger

Ironclad Beetle

strong body. The exoskeleton of the Ironclad is very tough and even a garage door banging down on one will not damage or disturb it!

All of these beetles can be safely handled and will walk over hands or an obstacle course set out for them. They will live for several months. Be sure to return them to their natural homes, because they have a valuable job to do—they take out the garbage!

Another addition to a beetle box could be the **Isopods**: Pill bugs and Sow Bugs. These are not insects—too many legs. They are Crustaceans, but they can get along in the same habitat with the same food as beetles. They especially like old flowers. They may have babies which will resemble the adults in miniature form and lighter color.

Gary McDonald

Pill Bug

Colin L. Miller

Sow Bug

Most kids know them as roly-polies, because they roll up in an armored ball when disturbed, so they can drop and roll away from any predator. If it does not roll up, then it is not the **Common Pill Bug** *(Armadillidium vulgare)*, but the larger **Dooryard Sow Bug** *(Porcellio laevis)*. Look for the two tiny piggy tails. A Sow Bug is also known as a Wood Louse.

Back to the beetles—one of the largest (over an inch long) and most interesting beetles to be found in the area from May through August is the **Ten–lined June Beetle** (two local species, *Polyphylla decemlineata* and *Polyphylla crinita)*. This is a scarab beetle, one of a large worldwide family of beetles that have been depicted in art and religions, principally of the Egyptians.

Gary McDonald

Ten-lined June Beetle

The Egyptians buried gems carved in the shape of scarab beetles in the heart cavities of mummies to signify their bravery and royalty. An Egyptian god in the shape of a scarab beetle was supposed to push the ball of the sun above the horizon every morning, just the same way the Egyptians saw the scarab dung beetles pushing a ball of dung along the ground. These beetles are large and attractive species, with all sorts of different stories about them.

Our local Ten-lined June Beetle flies very well at night, and may come to porch lights. They are the favorite food of many nocturnal mammals. When they are disturbed, they will make "fussing" noises by rubbing their abdomens against their wings. In spite of the fuss, they are fine to pick up. They are docile for handling, but if they open their elytra, they may be getting ready to fly off.

They can be kept in a plastic shoe box home with holes and a paper towel on the bottom. They eat pine needles, so they should be supplied with bunches of fresh green needles. Watch how they eat a whole needle, starting at one end and chewing it in like a strand of spaghetti. Notice their greenish brown colors and the ten lines down their backs, which gives them their name. Buried in a bunch of pine needles, this is great camouflage. It's difficult to see them!

Scarabs are noted for their antennae, which are like a row of plates mounted on a short stalk, and which can be clamped together or fanned out. The males have the larger array, those of the females are smaller. The

female may lay oval white eggs in the detritus on the bottom of their tank. As babies, they are grubs, living underground for three to four years eating the roots of various plants. They will form a pupa before becoming adults. The adults will usually live a couple weeks in captivity.

Spiders are really valuable members of backyard communities. Again, they are not insects or "bugs," but Arachnids, with eight legs. They are hunting predators that keep smaller insect populations from getting out of hand. It is really best to leave them undisturbed, because they are doing their job where they are. However, there are two species that can be easily and safely caught and kept for a while.

Cobweb Spiders *(Pholcus phalangioides)* may actually be living indoors already, or in the garage or sides and eaves of a house. They do a great job of eating lots of little critters we would rather not have around, and even will eat the Argentine Ants, which can become household pests.

Gary McDonald

Cobweb Spider

These spiders have a small round body, and hugely long legs, giving them the appearance of a daddy long-legs. They are usually in high corners with a filmy web. They spin around in fast circles if you poke their web. They are very delicate, so gently trap them in a container without touching them. Transfer the spider to a clear plastic wide mouth container with a clear lid that can be snapped securely shut. Make sure there are small airholes, and cut a trap door in the lid that can be secured with tape.

Drop small insects through the trap door into the container for the spider to catch and eat. It is surprising how hungry he is and how much he can eat. He gets moisture from his prey so a water dish isn't needed. He will live for a long time, so when finished observing his habits, be sure to release him in an area that needs "debugging."

Crab Spiders *(Misumenoides formosipes)* are usually found in the garden on flowers, sometimes mimicking the color of those flowers. They look like tiny crabs, with flattened triangular bodies, and they hold their legs out to the side like a crab. They can be white, cream, yellow, chartreuse, or pinkish, as they try to match the color of their flower over a few days. This is so an unsuspecting insect will come to the flower without seeing the hungry spider waiting there to catch it!

Eddie Dunbar

Crab Spider

On their backs, they have black markings—look upside down to see a little "smiley face." Some spiders in Hawaii carry this to the extreme and look like smiling clowns.

The fun in keeping these spiders is watching them grow and turn on a big "smile!" They don't spin a web, so they need something to sit on, perhaps an artificial flower in the same kind of spider container as described above. When released in the garden, they will hang around where they were let go.

Bad Bugs—Danger!

Out in the backyard or around lights at night, you be aware of the "bad bugs" which must be avoided, in addition to the obvious stingers, ants, bees, and wasps.

In warm weather from May until the cooler fall, a night-flying bug that may come to lights is the **Western Blood-Sucking Conenosed Bug** *(Triatoma protracta)*. The name enough should be a warning! The important thing here is to learn to recognize the bug: about ¾" long, flat, dull black, wings in an X on its back, stiletto-like stabbing and sucking mouthpart tucked under its body. This is different from

Donley Olsen

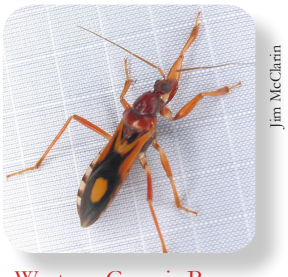
Western Blood-sucking Conenosed Bug

the Ground Beetles, which are round, shiny black, with straight division of the elytra on the back.

These bugs are dangerous. Step on them. Don't touch. They can bite and suck blood from humans, and in doing so inject a protein that calms the victim, but also can give a severe reaction including anaphylactic shock and death. A minor reaction is a huge, hot, red, itching welt.

Normally they live in Wood Rat nest piles, feeding off the rat blood with little effect. Without the primary host they will seek out humans, flying at night, attracted to light, slipping in through cracks to find a relaxed host to bite. Good reason for keeping the screen door closed!

A related nasty is the brightly colored **Western Corsair Bug** *(Rasahus thoracicus),* which is diurnal, or active during the day, and is found on plants. Again, don't touch. It can give a painful burning bite. Note the orange and black warning colors. It is about ¾" long, and has the bright orange and black pattern on its back, with wings crossed over its back, in "true bug" fashion.


Jim McClarin

Western Corsair Bug

Avoid any wasp-like insect found at lights at night.

We can help children learn a lot about the natural world by searching for, finding, and temporarily adopting some backyard bugs. Everyone will be learning a lot from the experience. Share the fun and knowledge!

Meet the "Bug Lady"

An Interview with

Sandy Russell

E. Gibson

Were you an outdoor kind of kid when you were young?

Sandy: Yes, definitely an outdoor kid. I learned to walk early chasing butterflies, and when not doing that was usually up in a tree.

Were you the girl who was afraid of bugs?

Sandy: Definitely not. I was the girl sitting in the back of the class playing with giant lubber grasshoppers instead of listening.

What did you study in college?

Sandy: College and graduate school were centered on American and English literature. I never had biology as I exempted the classes. I read and observed a lot on my own for sheer pleasure. However, later I audited a grad course on terrestrial arthropods at Yale.

When did you get interested in "bugs?"

Sandy: As soon as I could walk. My godfather was a horticulturist, and I followed him around and collected everything off his plants. My mother usually found them hopping or flying out of the lowest linen drawer before she learned to give me jars.

You are now an amateur entomologist who actively collects insects. Why? Why do you think most people ignore these small creatures?

Sandy: Collecting insects is only the start, identifying and studying the amazing numbers in a given habitat. This is important, because most people have no idea of how many there are, what they do, how interesting they are and how vital to the environment. Observation of behavior and how they change behaviors to adapt are important in knowing more about our own changing environment and climate.

For instance, many insects are "setting their clocks earlier" in terms of when they mature, mate, and produce offspring, because plant life that they use is also changing earlier in response to climate change. Insects from other areas to the south may migrate to our area also because of climate change. Those are just a couple issues that may be observed in insects.

Is this something you do every day?

Sandy: Yes, every day, and night. When I walk the dog first thing in the morning, there are many insects out early in the day to observe. Every night I run a night light trap to draw in nocturnal insects. They are not killed in the trap, but have many places to hide until I find them. I check the trap before dawn, so that they have a chance to escape before the birds start hunting. I observe which species of moths are having a flight period, and find new species coming into the area. This morning I heard cicadas calling and found one in a tree, captured it to show our garden landscaper, who had never seen one before. Once you learn to listen and look, you are constantly aware of insects around you.

What has observing bugs taught you about the natural world?

Sandy: Most people have never learned to be observant when outside. They have been taught that insects and small things are pests, rather than what keeps the world running. People ignored endangered species until they were taught about them.

Why should we pay attention to the world of bugs and insects?

Sandy: On a small scale, insect behaviors have a lot to tell us about our natural world and how it changes. Because they have short lives and produce many individuals, it does not take a long time to see changes happening. As pollinators, they are crucial to our food supply, as well as providing food for many other creatures that are part of the web of life. Aside from

the scientific importance, insects are both beautiful and bizarre, interesting and challenging--and provide entertainment and amusement as well. Who doesn't enjoy being surrounded with beautiful butterflies in the pavilion?

What changes have you seen in the local populations of insects?

Sandy:: Some species are becoming active earlier in the year, or are going through two generations a year when they previously had only one. New species are coming into the area from the south following climate change, or following food plants that spread or are introduced to our area. After the fire destroyed or altered the natural plant communities, some species diminished, others increased. Some insects change the kind of plant they favor as food.

If you could offer encouragement to kids who want to become entomologists, what would you say?

Sandy: Go for it. Get a good general guide book, so you can identify them and learn what other scientists have found so far. The internet also has many websites that help you identify unusual insects. Try our museum website, which is cataloging all the beetles in California!! Acquire suitable containers—from recycled plastic tubs with lids. plastic shoe boxes, or even critter tanks from the pet store. Catch insects alive, and give them what they need to survive in your container, food, water and shelter. Then watch and learn and enjoy them. There is so much to know about them, that sooner or later you will discover something that the other scientists have not yet found!

E. Gibson

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Web Sites
BugGuide.net
BugPeople.org Insect Sciences Museum of CA
Calphotos.berkeley.edu

Sandy Russell is a Docent at the Museum of Natural History where she shares her passion for insects with visiting school groups.